RESEARCH ARTICLE

Estimating Willingness to Pay for an Improved Service Delivery to Patients Referring Namazi Hospital Chemical Therapy Ward in Iran Using Contingent Valuation

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Abstract

Objective: The aim of this study was to estimate patients' willingness to pay (WTP) for improving the quality of non-medical aspect in Namazi hospital patients chemotherapy an assessment using the contingent valuation method (CVM). **Patients and Methods:** This was an applied, cross-sectional and analytical-descriptive study carried out in Iran, Shiraz in 2013. A sample of 185 patients was determined using random sampling. Multiple choice questions and follow-up open-ended questions were employed to elicit patients' WTP. The question asked patients would have to pay for this improving their own pocket. linear regression were used to Econometrically estimate the maximum WTP using STATA 11 software. **Results:** The results of this study indicated that 31% were male and 69% were female and the adjusted mean WTP was PPPUS$15 for pat maximum amount of willing to pay was for to get the same quality service in own city respondents (PPPUS$16) and minimum amount of willing to pay was to get advice of experienced nurse(PPPUS$10) Patients were willing to pay more if their satisfaction with two attributes of care were increased. The cancer type and income taking care of you are significant factors influencing a patient's WTP. **Conclusions:** In the worst socio-economic conditions of the people were willing to pay to improve the reducing wait times in receiving a drug and get the same quality service in own city respondents. In Future efforts Health policymakers should consider the ability to pay when making their decision.

Keywords: Chemotherapy- contingent valuation method- quality improvement- willingness to pay

Introduction

Nowadays, health and medical service quality can be defined according to service recipients' views and quality improvement requires creation of appropriate tools for accountability of health-medical system to customers' growing demands. In other words, challenge of quality measurement is to find a way to provide balance between patients and health service providers' expectations; and its starting point dates back to recognition of important issues according to patients and providers' views (Gyrd-Hansen, 2003). In this regard, the following question comes to mind that how much money people are willing to pay for increasing quality of medical and health service. This concept is defined under the general term of "willingness to pay" in the health economy. All customers have willingness to pay for certain features of goods or products. Willingness to pay means spending maximum figures by customers (Drucker, 1988). Contingent valuation method (CVM) is one of methods for measurement

of individual willingness to pay for goods or service. Contingent valuation method is often used to measure individuals' willingness to pay for non-market goods and service (Ruiz and Simon, 2004). This method requires analyzing individuals' answers to hypothetical items of questionnaires about individuals' preferences and their willingness to pay. Maxwell (1984), based on the model examined the quality of type`s service such az access to services, relevance to need (for the whole community), effectiveness (for individual patients), equity (fairness), social acceptability, efficiency. But the main question is that how many people paying to improve the quality of health services? The contingent valuation method (CVM) was developed as a method of eliciting WTP. The CVM was originally a method for measuring the benefits of pure public goods and services without markets, such as environmental goods including health (Shono et al., 2014). CVM is widespread due to its extensive capabilities one of which is estimation of price of goods that are not currently available, but we can make use of them

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in the future (Baker et al., 2014), Due to the lack of any market for goods and service in this method, we focus on people for measuring their values in order to find value of their preferences as a result of changes in quality of non-market goods, so that values of these goods can be estimated through creation of contingent markets. Therefore, the contingent valuation method (CVM) is also called the preference method (Lang, 2010). The sum of each individual's WTP can be regarded as the benefit to society of the intervention. Among the various methods used for measuring WTP, the CV is a flexible approach providing a conceptually correct and complete measure of WTP (Lin et al., 2014). This is the reason why in this study we adopt the CV method and conduct a survey among the general public to solicit the respondents' WTP (Tambor et al., 2014). Cancer diagnosis and treatment is a significant important service among provided service in hospitals. Surgery, radiotherapy, chemotherapy or hormone therapy may be necessary to treat cancer according to patient's stage of disease and medical history (Watson, 2006). Although the health and economic cost of cancer has been increasing in recent years, funding allocated for cancer research has not increased (Stewart et al., 2002). In Iran, provision of chemotherapy and radiotherapy service is mostly done at the third level of health system, namely hospitals in provincial capitals. University hospitals and some private hospitals provide these types of service for cancer patients in Fars province. Therefore, people come to visit Shiraz from different parts of province and sometimes neighboring provinces in order to receive service, and thus service quality can be affected by a large number of patients and waiting queues. It should be noted that dimensions of desired quality were determined using a pilot study with respect to importance of patients in the present research (Stewart et al., 2002). The purpose of this study was to use the contingent valuation method to elicit the willingness to pay for health care quality improvements.

Materials and Methods

This was an applied, cross-sectional and descriptive-analytic study conducted in Iran, Shiraz in 2013. The study population consisted of 185 cancer patients who were admitted in Namazi Hospital in Shiraz, in the south of Iran for chemotherapy in 2013. Data were collected between August 2013 and February 2014 CVM questionnaire was prepared, tested and administered by interviewers random sample of patients seeking care in governmental centers situated in the Namazi hospital. Respondents were recruited during July–August 2013. Data were collected using the CVM questionnaire in the six non-medical aspect: improving physical, environment, facilities, reduction of waiting time drug to one-third the current, reduction of admit wait times, to get advice of experienced nurse and to get the same quality service in own city respondents. Our analysis proceeds in three steps. First, we estimate the value to quality of non-medical aspect in chemotherapy in Namazi hospital. Six attributes used to measure the quality of services. Second, we estimated Minimum and maximum willingness

to pay for open questions for each dimension separately as a pilot in the patient. Finally, we used to estimate the mean WTP and to examine the effect of independent variables on the referendum data. The independent variables were selected based on the economic theory and relevant knowledge including the WTP and Similar studies: sex, age, marital status, education, employmenst status, income (Lang, 2010), type of disease ,stage of the disease, health status, insurance status, do radiotherapy, do surgical (Chunyu et al., 2012), number of referral (Yasunaga et al., 2011). T- tests and chi square tests were used to compare differences between of willingness to pay with demographic and social factors of several categories. We used multiple regression analyses to estimate the association of demographic and disease variable with willingness to pay. For the final models, we omitted variables that were not found to be significantly associated with willingness to pay. The following basic econometric model were determined:

$$WTP = \beta_1 + \beta_2 \, Job + \beta_3 \, ln \, Income + \beta_4 \, Education + \beta_5 \, Disease + \beta_6 \, Stage \, of \, disease + \beta_7 \, Do \, radioterapy + \beta_8 \, Do \, surgical + \beta_9 \, Have \, Supplementary \, insurance$$

The variable of income was also entered into the model in a continuous and Job, education, disease stage of disease, radiotherapy, surgical, have supplementary insurance entered virtual manner. Ordinary Least Squares or OLS is one of the simplest (if you can call it so) methods of linear regression. In all analytical and statistical tests used in this study, a P value < 0.05 was considered statically significant. The goal of OLS is to closely "fit" a function with the data. It does so by minimizing the sum of squared errors from the data. In addition to, Before estimating model, co linearity, correlation, specification error, homogeneity of variance and normality examined using econometric tests. The Breusch–Pagan test tests for conditional heteroskedasticity it is a chi-squared test that the test statistic is χ^2 with k degrees of freedom. It tests the null hypothesis of homoskedasticity. If the Chi Squared value is significant with p-value below an appropriate threshold (e.g. p<0.05) then the null hypothesis of homoskedasticity is rejected and heteroskedasticity assumed. If the Breusch–Pagan test shows that there is conditional heteroskedasticity, the original regression can be corrected by using the Hansen method,using robust standard errors, or re-thinking the regression equation by changing and/or transforming independent variables (Gujarati, 2009). The Ramsey Regression Equation Specification Error Test (RESET) test is a general specification test for the linear regression model. More specifically, it tests whether non-linear combinations of the fitted values help explain the response variable. The intuition behind the test is that if non-linear combinations of the explanatory variables have any power in explaining the response variable, the model is mis-specified (Wooldridge, 2013). The Shapiro–Wilk test is a test of normality in frequentist statistics. It was published in 1965 by Samuel Sanford Shapiro and Martin Wilk. The null-hypothesis of this test is that the population is normally distributed. Thus if the p-value is

less than the chosen alpha level, then the null hypothesis is rejected and there is evidence that the data tested are not from a normally distributed population. In other words, the data are not normal. On the contrary, if the p-value is greater than the chosen alpha level, then the null hypothesis that the data came from a normally distributed population cannot be rejected. Swilk can be used with 4 - 2000 observations (Razali and Wah, 2011), Linktest performs a link test for model specification after any single-equation estimation command, such as logistic, regress, stcox, etc (Savescu and Laba, 2016). A link test can be run after any single-equation estimation command. The test is based on the idea that if a regression equation is properly specified no additional independent variables should be significant above chance. The link test looks for a specific type of specification error called a link error wherein< a dependent variable needs to be transformed (linked) to accurately relate to independent variable (Angrist and Pischke, 2008). The link test adds the squared independent variable to the model and tests for significance versus the nonsquared model. A model without a link error will have a nonsignificant t-test versus the unsquared version (Wooldridge, 2000). An F-test is any statistical test in which the test statistic has an F-distribution under the null hypothesis. It is most often used when comparing statistical models that have been fitted to a data set, in order to identify the model that best fits the population from which the data were sampled. If the P value for the F-test of overall significance test is less than your significance level, you can reject the null-hypothesis and conclude that your model provides a better fit than the intercept-only model (Sanderson and Windmeijer, 2016). R-squared is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determination for multiple regression (Chen and Nkurunziza, 2015).

It should be noted that purchasing power against the dollar is an economic method for determining the relative value of the two currencies. Given the varying value of different currencies and the fact that the price of a product varies according to economic conditions in different countries, and then a special index is required to compare between different countries and services. To solve this problem, according to statistics extracted from WHO and World Bank websites in 2011, the equivalent of one PPPUS$ was calculated in Iranian Rial and for calculations in following study this coefficient was used to change Iranian Rial to PPPUS$.

Quality assessment

A total of 205 patients were approached and asked to answer the questionnaire. 185 (90.2%) gave their consent to participate in the study. after interviewing and examining patients, they founded the worst and the best quality From their point of view.

Reliability and Validity

To enhance the validity of a CV study, Mitchell and Carson (Mitchell and Carson, 1989) stressed that the key scenario elements must be understandable, meaningful,

and plausible. That is, the WTP questions must be clear and unambiguous, respondents should be familiar with the commodity to be valued, and respondents should have had prior valuation and choice experience with respect to consumption levels of the commodity (Mitchell and Carson, 1989; Asgary et al., 2004). The CV method uses survey questions to elicit people's preferences for public goods by finding out what they would be willing to pay for specified improvements in them (Mataria et al., 2006). The method is thus aimed at eliciting their willingness to pay (WTP) in dollar amount circumvents the absence of markets for public goods by presenting consumers with hypothetical markets in which they have the opportunity to buy the good in question (Cai and Zhang, 2007). The hypothetical market may be modeled after either a private goods market or a political market. Since the elicited WTP values are contingent upon the particular hypothetical market described to the respondent, this approach came to be called the contingent valuation method (Mitchell and Carson, 2013; Lang, 2010). Respondents are presented with material, often in the course of a personal interview conducted face to face (Fu et al., 2011). Nevertheless, our estimation may be underestimated. It is possible that the WTP value seen in a hypothetical situation is lower than the WTP in a real situation (Baker et al., 2014). General criticisms of CVM include the fact that WTP differs from the actual payment (Shono et al., 2014), and that the WTP is not a monetary value but only a sense of satisfaction (so-called warm glow) when paying (Gyrd-Hansen, 2003; Getzen, 2007).

Results

Demographic Characteristics

The demographic characteristics and health status of respondents were summarized in Table 1. In total, 185 patients completed the interview. There were more female respondents than males respondents (69.2% vs. 30.8%). Most of the respondents were either married or had partners (90.8%). Most respondents had insurance (95.1%) and only 33% of the respondents had a supplementary insurance; More than half of the respondents had an education level lower than high school, and only 12.4% of the respondents had a college education. About 65.9% of the respondents were currently unemployed. Half of the respondents (53.1%) had a monthly disposable income less than $200; 39.4% had a monthly income between $200 and $400; 7.5% had a monthly income of more than $400. Half of the respondents (58.9%) were between 40 and 60 years old. Due to the high frequency of women in the sample 49.2% of respondents were had with breast cancer; (and 149.5% had colon, rectal and stomach cancer); and 74.1% of respondents had surgery.

Robust standard errors in Stata define in the context of a linear-normal regression model with possible misspecification in the variance function or conditional expectation. There are a lot of reasons to avoid using robust standard errors. Technically what happens is, that the variances get weighted by weights that you cannot prove in reality. Thus, robustness is just a cosmetic tool. In general you should think about changing the model.

Table 1. Description of Demographic Characteristics and Health Status of the Respondents

Characteristics and categories	Number	Percentage	Characteristics and categories	Number	Percentage
Sex			Have supplementary insurance		
Male	57	30.8	Yes		67
Female	128	69.2	N0	124	33
Marital status			Household income (PPPUS$ per month)		
Married or with partner	168	90.8	< 200 PPPUS$	98	53.1
Divorced or separate	17	9.2	200$-400 PPPUS$	73	39.4
			>400 PPPUS$	14	7.5
Employment status			Cancer types		
Employed	179	91.4	Breath cancer	91	49.2
Unemployed	16	8.6	Colon, rectum cancer	36	19.5
			Bladder ; prostate cancer	11	5.9
			Lymphoma cancer	34	7
Education			Number of referral (per month)		
Primary or less	105	56.8	1	140	75.6
high school	57	30.8	2	31	16.8
College and Postgraduate	23	12.4	2+	14	7.6
Age , y			Disease classification		
<40	41	22.2	Low risk	154	83.2
40-60	109	58.9	Moderate/high risk	31	7.6
60+	35	18.9			
Have insurance			Surgery received		
Medicare	176	95.1	Yes	137	74.1
Private (non-Medicare)	9	4.9	No	48	25.9
			Do radiotherapy		
			Yes	37	20
			No	148	80

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There are a lot of implications to deal with heterogeneity in a better way than just to paint over the problem that occurs from your data. Take it as a sign to switch the model. The question is close related to the question how to deal with outliers some people just delete them to get better results, it's nearly the same when using robust standard errors (Pavlov, 2010; Savescu and Laba, 2016).

Table 2. Estimates of Attributes Quality But It is Necessary before to Estimate OLS (ordinary least squares) Investigated the Homoscedasticity of Variance, Standard Normal Distribution Data, Specification Error and Bias

test	p-value
Breusch-Pagan	0.001
Ramsey RESET	0.069
Swilk	0. 116
Linktest	0.469

A P value < 0.05 was considered statistically significant

Regression analyses

Table 3 shows the WTP for an improved service delivery to patients referring by open-ended linear regression. The logarithm of monthly household income is a highly significant positive factor, which is consistent with the economic theory (do play the significant roles in changing the willingness to pay). Compared with colon, rectum cancer, bladder, prostate cancer and other diseases, breast cancer patients show a significant positive willingness than other patients to pay extra fee for obtaining improved services. The patients were not more educated patients, the less they wanted to pay for improved service. The open question result was analyzed by multiple log-linear regressions. The F test of the multiple repression was significant (P < 0.04).

Discussion

This study provides important information about the monetary valuation of six quality attributes of health

Table 3. Factors Influencing a Patient's Willingness to Pay (WTP) for an Improved Service Delivery to Patients Referring Namazi Hospital Chemical Therapy Ward (Open-ended WTP Linear Rgression)

Independent variable	categories	Coefficient	p_value
Employment status	Employed	23709	0.127
	Unemployed	-5750	0.319
Education	Primary or less		REF
	high school	197	0.967
	College and Postgraduate	274	0.223
Household income (PPPUS$ per month)	200-400 PPPUS$	9928	0.032
	< 400 PPPUS$	11545	0.258
	200 PPPUS$ <		REF
Cancer types	Colon,rectum cancer	-13402	0.115
	Bladder ; prostat cancer	6132	0.035
	Other diseases	12544	0.093
	Breast cancer		REF
Surgery received		-7142	0.2
Do radiotherapy		5031	0.392
Disease classification		-4044	0.544
Have supplementary insurance		-1162	0.819
Mean WTP	SD	Max	Min
15 PPPUS$	1	7	5
Number of obs=185	P-valu= 0.04	F-Statistic=1.74	$R^2 = 0.1999$

services by to patients referring Namazi hospital chemical therapy ward with using the contingent valuation method (CVM). In the other word In this research, the factors affecting the WTP on cancer patients in Shiraz, Iran during 2013-2014 were studied. The results indicated that among the studied variables, Among six quality attributes, consumers were willing to pay more to improve two quality attributes the reducing wait times in receiving a drug and get the same quality service in own city respondents. The results also indicate that patients with higher income levels are willing to pay more. In addition, our study results suggest that undesirable physical space within the sector as the factors that visitors bothering. The physical space can help improving patients' satisfaction, while thirty percent of respondents were in favor of giving more money to improve the physical space sector. The large gap between supply and demand to receive medicine has resulted in protracted wait times for this procedure in hospital and in similarly structured health care systems public facilities chemotherapy. In conclusion, this study has shown that it is feasible to use contingent valuation in order to measure the benefits of a medicine that reduces the dissatisfaction in order to improve the quality of service delivery to patients referring Namazi hospital chemical therapy ward. The results show this benefit is PPPUS$ 15 in per referring to chemical therapy ward. Regardless of partial differences in willingness to pay of the obtained by results, it could be concluded surveys willingness to pay for improving quality in low- and middle levels there. Cancer is costly. It can take a toll on health, emotions, time, relationships – and wallet in patients. There will be unexpected charges, and even the best health insurance won't cover all the costs. People participated in the study were in the treatment process, thus inadvertently removal have direct and indirect impact of the willingness to pay. In other words, when compared with the measured

willingness to pay for preventive services, the average is less. The results of comparison of means test showed that the highest level of willingness to pay was associated with higher education. The findings of regression analysis also revealed no significant relationship between willingness to pay and education (P-value>0.05) consistent with the results of studies as willingness to pay for prostate cancer treatment among patients and their family members at 1 year after diagnosis (Chunyu, 2012) and Lang (2010) reported in his previous work "willingness to pay for lung cancer treatment". Moreover, a significant and positive relationship was observed between level of income and willingness to pay. The ultimate effect of this variable (income) was 0.032 indicating that a rise in the level of income among individuals could increase the level of willingness to pay by 3.2% compared to that of the reference group. It has been reported another studies (Lang, 2010; Chunyu et al., 2012). Also, the results of regression analysis showed that supplemental insurance despite expectations had no effects on the level of willingness to pay among individuals. The best answer to explain this was that the subjects were patients mostly suffering from cancer whose treatment costs were usually less covered by insurance or reimbursed by passing a lot of time from the moment of payment. Gender, age, and marital status had also no impacts on the level of willingness to pay among individuals in line with the results of a research study as "Assessing willingness to pay for cancer prevention" (Milligan et al., 2010). Besides, the results of regression analysis revealed that the variable of disease stage had no significant effect on the level of willingness to pay. Nevertheless, no significant difference was found between the level of willingness to pay among informed and uninformed individuals (Yasunaga et al., 2006). In the regression model, radiotherapy and surgery were identified as variables with no impacts on willingness to pay, It has

been reported in previous studies (Chunyu et al., 2012). On the other hand, in an investigation (Milligan et al., 2010), the slight degree of the disease was identified as an influential variable in this respect. According to the results obtained from the regression analysis, it was demonstrated that individuals' level of income was the most important variable in determining the level of willingness to pay although the results of comparison of means test showed that factors such as occupation, education, disease type, disease stage, and radiotherapy played their own roles in differences observed in the level of willingness to pay among different groups. In all the research papers reviewed in the present study, the results suggested that poverty reduced individuals' access to resources and even it had a strong effect on the level of willingness to pay and its presence or absence among individuals, as well as preferences revealed by special groups of people such as women and the elderly. In the present study, such a variable inadvertently had a direct and indirect impact on the level of willingness to pay among individuals because cancer treatment is very costly. In addition, in terms of interviews with people and filling in the forms, it was concluded that people with different attitudes had various preferences for improved quality of services. In previous studies (Lang, 2010) suggested that governments should enforce a safety net for the low-income group to reduce their financial burden. It is suggested that a prompt economic evaluation of the lifetime cost and effectiveness of any improving service in the quality of non-medical aspect in Namazi hospital patients chemotherapy. This study has several limitations: first, no cooperation by patients in order to complete the data collection form (questionnaire) which was solved through inviting patient attendants to do such a procedure and second unwillingness of patients to provide income information which was resolved by obtaining data from household spending.

In conclusions, in Iran, cancer disease has great impact on both the value of productivity and life lost because of both its incidence and mortality rate. Our study shows that patients would like to pay less than the actual cost of these improving the quality of non-medical aspect. Government and health policymakers should consider the ability to pay when making their decision to cover or not to cover these service. Our results showed in the worst socio-economic conditions of the people were willing to pay to improve the reducing wait times in receiving a drug and get the same quality service in own city respondents. Future efforts to develop acceptable prioritization strategies for publicly funded for improving quality. Health policymakers should consider the ability to pay when making their decision.

Acknowledgements

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